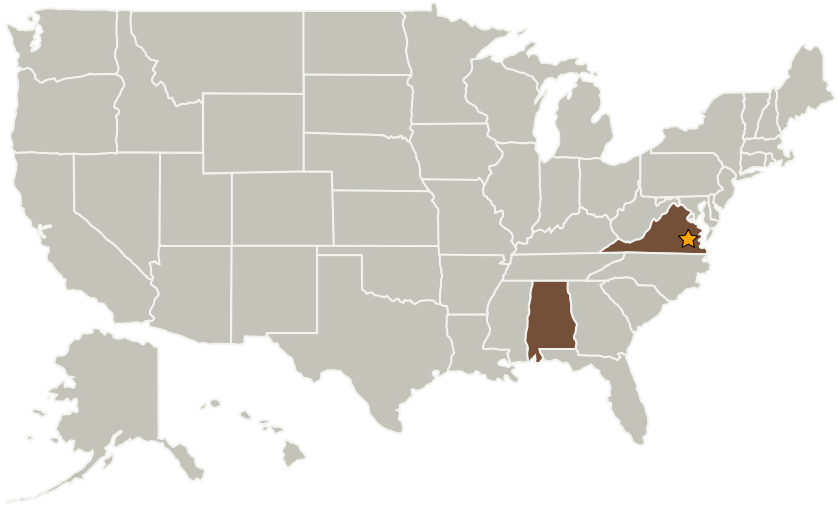
A Novel Radiation Shielding Material, Phase I

Completed Technology Project (2004 - 2004)

Project Introduction

In order to safely explore space, humans must be protected from radiation. There are 2 predominant sources of extraterrestrial ionizing radiation, namely, Galactic Cosmic Rays (GCR) consisting primarily of nuclei of atoms (up to Fe) and Solar Energetic Particles (SEP), which includes mainly high-energy protons. In addition, neutrons that are formed due to breakdown of the incoming radiation flux in the shielding material have to be accounted for. An innovative, castable, boron coated, polyethylene epoxy is potentially a cost-effective lightweight radiation shielding material possessing structural as well as shielding properties. During Phase I, techniques will be evaluated for coating polyethylene particles with boron to prevent sedimentation of the higher density boron in the epoxy. In addition, techniques will be developed to uniformly disperse these particles in an epoxy matrix. Radiation simulations will also be performed. From these simulations it will be determined what parameters, such as volume percent boron coated, polyethylene particles, are necessary for this material to provide optimal protection to humans and electronics in a deep space environment. During Phase II, the fabrication techniques will be optimized. Samples will be produced for extensive mechanical properties testing as well as for radiation testing.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Langley Research Center (LaRC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Langley Research Center(LaRC)	Lead Organization	NASA Center	Hampton, Virginia
Plasma Processes, LLC	Supporting Organization	Industry Veteran-Owned Small Business (VOSB)	Huntsville, Alabama

Primary U.S. Work Locations	
Alabama	Virginia

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Scott O'dell

Technology Areas

Primary:

- TX06 Human Health, Life Support, and Habitation Systems
  - TX06.5 Radiation
    - TX06.5.3 Protection Systems